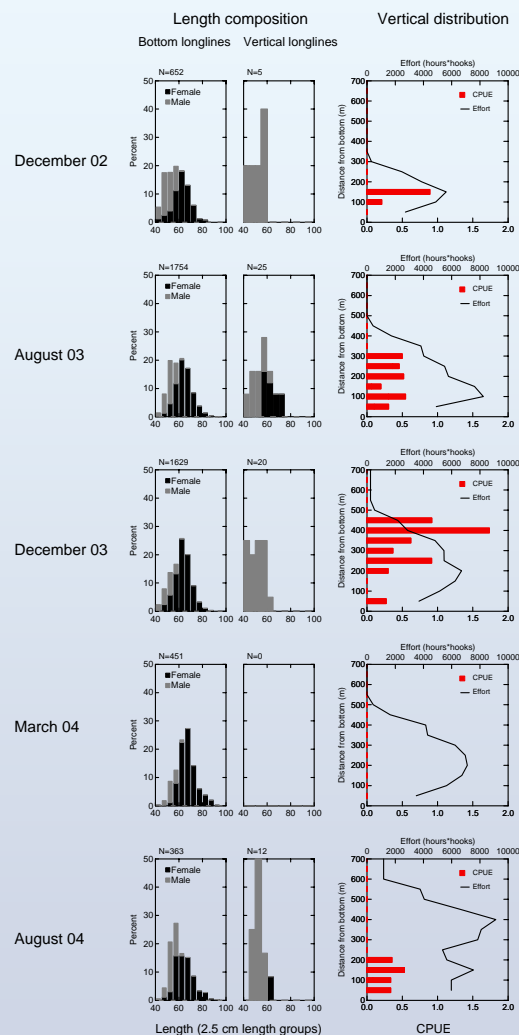


Pelagic occurrence of Greenland halibut studied by means of vertical longlines

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ICES CM 2004/K:69



Length composition of catches from bottom and vertical longlines (left), and vertical distribution of pelagic catches and effort (right).

OBJECTIVE: The purpose of this study was to investigate if pelagic occurrence of Greenland halibut is evenly distributed among sexes, size-classes and between sampling periods.

BACKGROUND: The flatfish Greenland halibut (*Reinhardtius hippoglossoides*) is considered a demersal species, and survey indices based on bottom trawl catches are used in annual assessments. However, stomach contents indicate that the species may feed pelagically. If the proportion of pelagic Greenland halibut varies between surveys, bottom trawl indices may not reflect the true development of the population. Since the species cannot be studied acoustically due to low acoustic contrast, very little is known about the pelagic occurrence.

METHODS: Greenland halibut was fished in the main adult area along the continental slope between North Norway and Svalbard by means of vertical longlines during three time periods of the year. Concurrent bottom longlines were used as comparison and trawl samples were used to sample stomach contents of individuals at the bottom.

- **Adult Greenland halibut of all sizes may be encountered pelagically.**

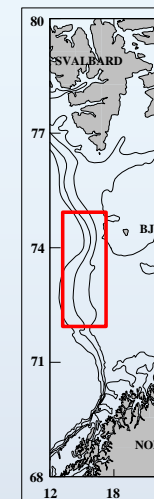
A total of 63 Greenland halibut were caught with vertical longlines, up to 420 m off the bottom. They ranged in size from 40 to 72 cm, approximately the same size range as found with bottom longline in the same area.

- **Males were caught more often than females in the water column**

Males dominated among vertical longline catches, whereas females dominated among demersal longline catches.

- **Pelagic occurrence varied between sampling periods**

Pelagic catches were more important in August and December than in March. However, stomach contents from bottom trawl catches included pelagic prey (herring) in all time periods sampled.



Map of the study area



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The life history, Dynamics and Exploitation
of Living Marine Resources: Advances in
Knowledge and Methodology

Pelagic occurrence of Greenland halibut (*Reinhardtius hippoglossoides*) studied by means of vertical longlines

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Abstract

In order to calculate reliable survey indices it's important to know the dynamics of vertical distribution of a fish species. The vertical distribution of Greenland halibut (*Reinhardtius hippoglossoides*) cannot be studied acoustically due to low acoustic contrast. Therefore a series of experiments were designed to catch the species pelagically in the Barents Sea. Sampling was made by means of vertical longlines during three time periods of the year. The paper presents preliminary results from the experiments. Catch-rates through the water column was analysed and population structure compared between demersal and pelagic samples. Stomachs from bottom trawls were analysed to identify pelagic prey. At 400-700 m bottom depth, individual Greenland halibut were caught up to 420 m off the bottom. Individuals of all sizes were caught pelagically, but catches were dominated by smaller males. Pelagic occurrence varied between sampling periods, being more important in August and December than in March. Still, pelagic prey were found in stomachs from all seasons.

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1. Introduction

The Greenland halibut (*Reinhardtius hippoglossoides*) is considered a demersal species, and annual assessments are based on yearly routine bottomtrawl-surveys. However, stomach contents indicate that the species may feed pelagically (Hovde, Albert et al. 2002); (Michalsen and Nedreaas 1998), and it has occasionally been caught at the surface in salmon nets off West Greenland (Smidt 1969). In order to have reliable stock indices, knowledge on the species' vertical behaviour is essential. Since the species cannot be studied acoustically due to low acoustic contrast, very little is known about its pelagic occurrence. In a study from the nursery and deep water areas in West Greenland waters they found that one-year-olds undertook vertical feeding migrations at night while older individuals were rarely encountered pelagically (Jørgensen 1997).

The purpose of this study was to investigate if pelagic occurrence of Greenland halibut is evenly distributed among sexes, size-classes and between sampling periods. Indirect observations on pelagic feeding migrations were obtained from stomach contents from bottom trawl samples. The study is a part of a larger joint Russian-Norwegian research program on Greenland halibut.

2. Material and methods

Greenland halibut was fished in the main adult area along the continental slope between North Norway and Svalbard by means of vertical longlines during three time periods of the year, March, August and December (Fig. 1). Concurrent bottom longlines were used as comparison, and trawl samples were used to look at stomach contents of individuals at the bottom.

The vertical longline was made up of anchor – rope – 180 m hooked longline – rope – bouy (Fig. 2). Each trial used three vertical longlines mounted with different rope lengths, deployed as close together as possible. Together they covered the whole water column. Data Storage Tags (Star Oddi's DSTmilli) were attached at top and bottom of the hooked longline to pinpoint its position in the water column. Greenland halibut stomachs were collected by bottom trawl. The time-gap between longline and trawl sampling was less than two weeks. Table 1 shows a summary of the material.

The catch per unit effort (CPUE) was calculated as $CPUE = (No. \text{ of indiv.} / \text{Effort}) * 1000$ where $\text{Effort} = \text{Time (hours)} * \text{Number of hooks}$.

3. Results and discussion

A total of 63 Greenland halibut were caught with vertical longlines up to 420 m off the bottom (Fig. 3). They ranged in size from 40 to 72 cm, approximately the same size range as found with bottom longline in the same area. This shows that adult Greenland halibut of all

sizes may be encountered pelagically. However, smaller males dominated among vertical longline catches while larger females dominated among bottom longline catches.

Pelagic catches varied throughout the season, being considerably higher in August and December than in March (Fig. 2). Still, pelagic prey such as herring (*Clupea harengus*) and blue whiting (*Micromesistius poutassou*) were found in Greenland halibut stomachs from all season.

So far, the results show that Greenland halibut occur regularly in large parts of the water column. In the continuation of the study we will try to identify factors influencing the species' pelagic behaviour. Amongst others, results from acoustic surveys will be used to investigate presence and distribution of pelagic prey during the sampling periods.

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Table 1. Summary of material.

	Dec. 2002	Aug. 2003	Dec. 2004	Mar. 2004	Aug. 2004
No. of successful trials (à 3 longlines)	5	8	10	16	18
Greenland halibut, pelagic	6	25	20	0	12
Greenland halibut, bottom	652	1754	1629	451	363
Non-empty stomachs (trawl)	-	95	26	246	-

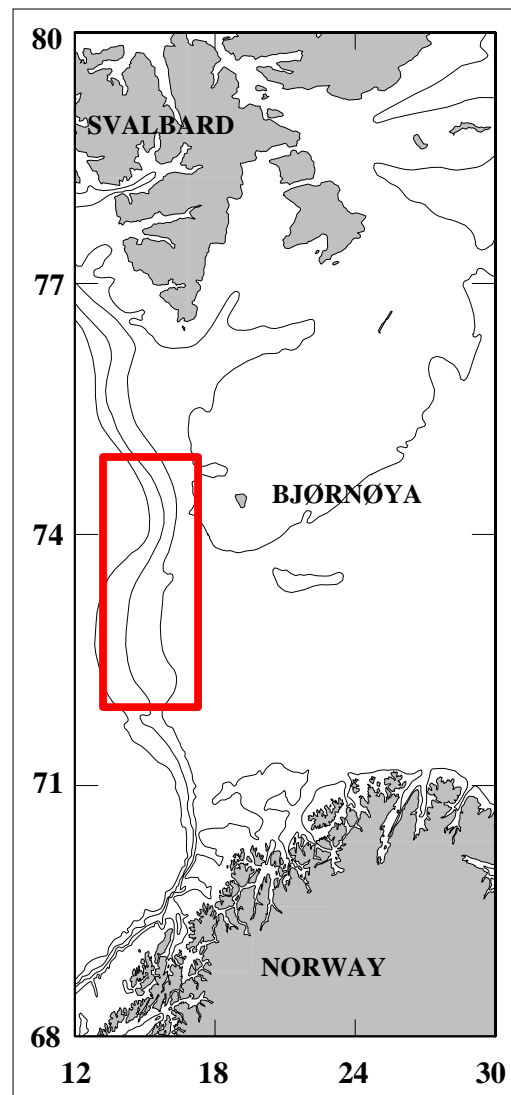


Figure 1. Map of the study area

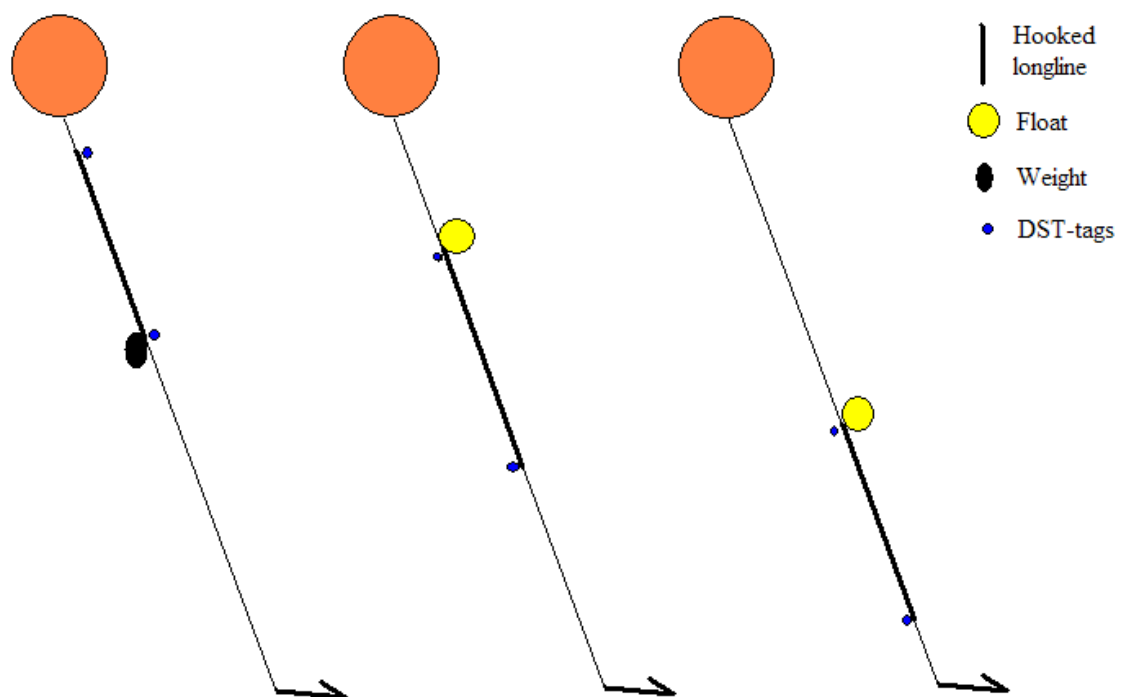


Figure 2. Mounting of a set of 3 vertical longlines.

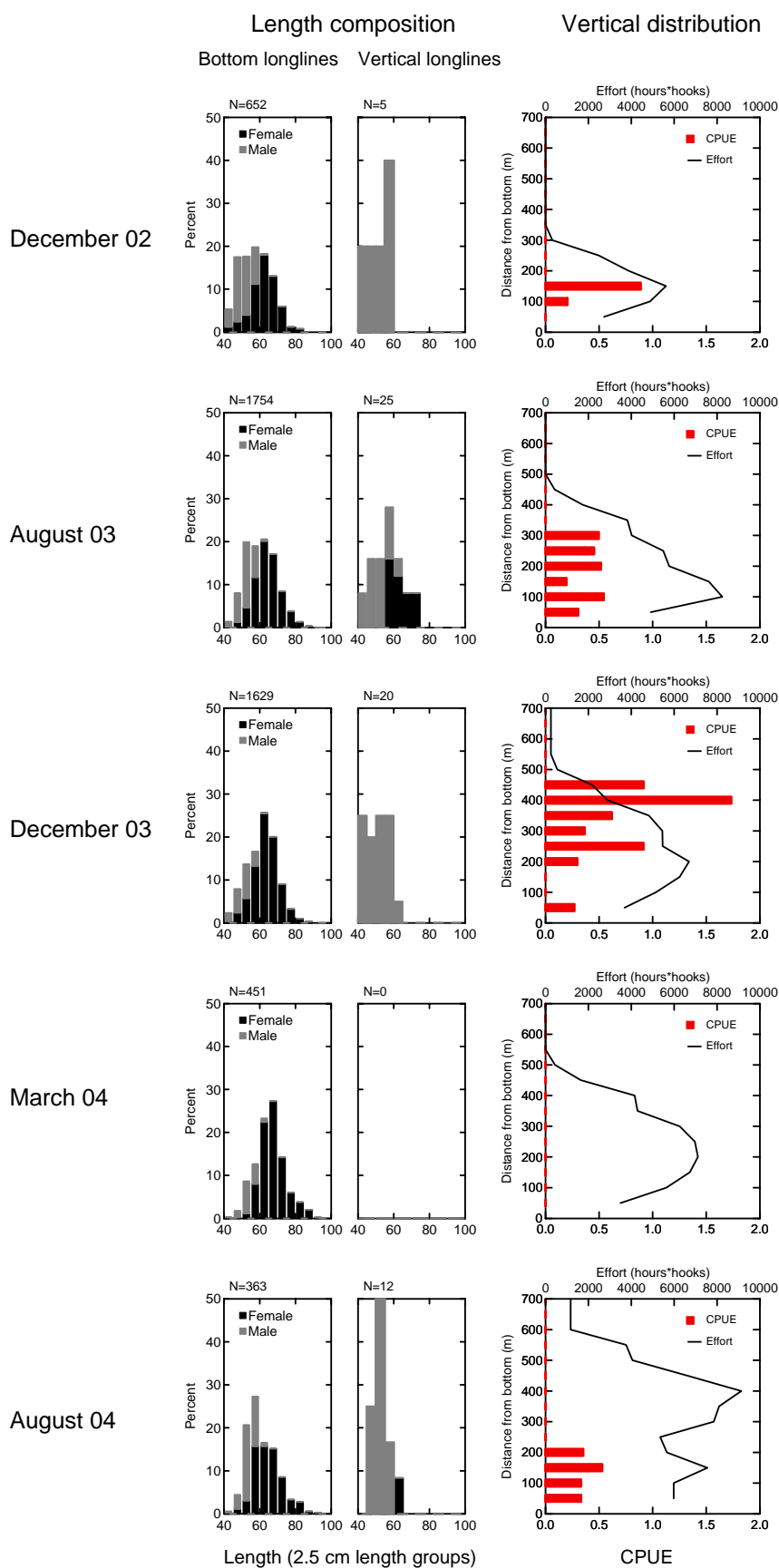


Figure 3. Length composition (2.5 cm length groups) of catches from bottom and vertical longlines, and vertical distribution of pelagic catches/effort.